2.4. Single Minute Exchange of Die (SMED): Main Component Exchanges and Construction
(continued)

It may be the case, for example, that there are other areas that should be addressed first before changeovers. If mechanical reliability is a greater loss point than changeovers, it may make more sense to focus on implementing a reliability centered maintenance program before reducing changeovers. In this scenario, changeovers may have additional variability due to mechanical issues that arise and need to be corrected in that downtime.

2.5. Overall Equipment Effectiveness (OEE): Hourly or Energy Based Availability

Overall equipment effectiveness (OEE) is a standard for measuring manufacturing productivity. The concept was developed in the 1960s to evaluate how effectively a manufacturing operation is utilized. Because results are expressed as a percentage of standard, OEE can be compared between different operations or industries. To achieve a score of 100% OEE, a system must run at 100% quality: zero defects, 100% performance, and as fast as system design speed allows. It must also run at 100% availability: no stop time. By measuring OEE and the underlying losses, productivity can be systematically improved. Variances from standard can be graphed in a Pareto diagram, and improvement plans can be made to address the highest impact losses from system performance. Because OEE takes into account all loses, it can be considered a holistic measure of performance.

2.6. 5S (Sort, Set, Shine, Standardize, Sustain): Inventory and Tool Management

5S is a process to reduce waste, improve safety, and optimize productivity through maintaining an orderly workplace and using visual cues to achieve more consistent operational results. 5S addresses many of the eight wastes of production, and many organizations use 5S to set a foundation for developing a continuous improvement culture. 5S is equally applicable and effective in all sectors.

The process was developed in manufacturing and was popularized by Toyota. The term 5S references the first letter of the Japanese words for each step in the process. English translations are not exact but typically maintain the nomenclature. 5S requires the user of a workspace to be directly involved in the organization and sustainability of the process. Consistent utilization of this method can lead to a greatly increased sense of ownership for equipment, with gains in safety, quality, morale, and productivity.

3. Applying Lean Concepts in Wind Site Management Operations

3.1. Organizational Alignment and Commitment to Continuous Improvement

As companies implement continuous improvement to streamline processes and reduce costs, too often lean tools are deployed as the objectives rather than as specific project goals. Unfortunately, training for these tools is typically done in a shotgun approach, delivering an unintentional message that short-term results are the desired endgame. These project initiatives may result in respectable cost savings, but on their own will never release the full potential of people in an organization unless reviewed and aligned with corporate goals. So before anyone trains and assigns champions to implement 5S principles, standardize a service, or optimize warehouse inventory, a more fundamental focus on team culture and organizational alignment needs to be framed at all levels.

Since “you cannot improve what you can’t measure,” a lean program will typically start with an event defining the organizations key metrics, including how they will drive department, team, and finally individual day-to-day measures. Every company has a mission statement or a set of goals based on visions and values that coalesce into a written declaration of its core purpose of existence. The first stage in developing a continuous improvement culture is for everyone to understand the organizational measures and how they will affect the strategic goals.

Most organizational measures can be organized into one of Kaplan and Norton's four categories of a balanced scorecard: customer, financial, process, and learning and growth[1]. In addition, manufacturing and heavy industry typically use safety as a fifth category. With long-term and annual strategic goals for reference, each department and team should brainstorm key measures that align their daily activities with the corporate goals.

When developing these measures, no more than one or two per category are necessary. Using a benchmark, like the 31 seconds visual management rule, basic dashboard metrics would provide anyone a three second process overview, a 10 second display of trends, and in 20 seconds identify the solutions and proposed improvements currently being pursued. Then, by creating tiered metrics, an organization can use dashboards to drive daily team huddles (stand up or green area meetings), further aligning management and supporting departments with field operations in vision and direction. This not only helps provide clear instructions and goals for individual accountability, but also enables better information sharing and planning to address critical issues as they develop. These are all important first steps in developing and maintaining a continuous improvement culture.

3.2. Cultural Onsite Enablers

A company culture is generally defined as the collective way in which employees interact to make the day-to-day, large and small, decisions that execute the organization's vision and strategy. Even with all of their strengths, lean tools arguably only contribute 20% to a successful continuous improvement program. However, if an organization has a strong lean culture, it will contribute the other 80%. Hence, once the foundational strategy is clear to everyone and measurement goals are established, additional cultural enablers can be developed into a framework that promotes a philosophy of seeking perfection in all work processes.

Clear goals and metrics, along with daily communication, are clearly important in a lean culture as described. Still, much of a cultural foundation lies in linking common HR behavior expectations to lean implementation rules and standards. The processes of recruitment, formal orientation, training, individual development, and reward systems all play a large part in giving employees the basic skills and instincts to contribute to company improvements. And once these links have been shaped, the focus must be redirected to leadership, which needs to gain the respect of new employees through both coaching and mentoring performance objectives.

Organizational alignment and culture building are not complicated, but the processes are broad in scope. Development of a lean culture needs to cascade through an organization and be introduced from the moment a potential candidate is interviewed, through orientation and on-the-job training, and continue well into a person’s career with the company. This enables leadership to demonstrate humility by constantly engaging employees and providing them with personal learning and development opportunities for growth.

3.3. Common Mistakes and Lessons Learned

There is plenty of opportunity to learn from poorly implemented lean programs. The internet is littered with case studies and war stories of improvement projects gone wrong. For wind energy, the top ten common mistakes can be summed-up as follows: